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UNIVERSITY OF IDAHO,

COLLEGE OF AGRICULTURE.

Idaho - Agricultural - Experiment - Station.

BULLETIN NO. 4.

JULY, 1893.

1. Methods of Preventing Smut in Wheat and Oats.
2. Carbon Bisulphide as a Squirrel Exterminator.
3. A New Squirrel Exterminator.

These Bulletins are sent free to all residents of Idaho who apply for them.

This Station desires to exchange publications with all the Agricultural papers in the United States and Canada, and all Idaho papers.

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W. F. Cash.....
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T. T. Rutledge.....
....Assistant Director, Station No. 3, Nampa.

Central Office and Laboratories, University of Idaho, Moscow.

Address all communications to the DIRECTOR, EXPERIMENT STATION, UNIVERSITY OF IDAHO, MOSCOW, IDAHO.

I.

METHODS OF PREVENTING SMUT IN WHEAT AND OATS.

BY CHARLES P. FOX, DIRECTOR.

Smut in wheat and oats is too well known to the farmers of Idaho, to need an elaborate description.

The aim of this BULLETIN is to place before the farmers some practical information concerning certain remedies which have been successfully used as preventives of this disease.

The smuts are parasitic plants belonging to the fungus group. These plants reproduce themselves by spores. The smutted kernels of grain consist, usually, of a mass of these spores.

These masses are broken up, and scattered by the wind and by the operation of threshing. The spores, in this way, become lodged upon the kernels of sound grain.

When sown into the soil, they germinate after the manner of the higher plants. After germination they enter the young host and grow at its expence until harvest time when millions of spores are ripened instead of grain.

Of the many kinds of smut affecting the cereals only two are reported, so far, as causing much damage in this state. These are the "loose smut" of oats and the "stinking smut" [bunt] of wheat. Although these smuts are quite unlike in many individual characteristics, the same method of prevention applies to both. Two methods of treatment are in general use:

1. THE VITRIOL OR BLUESTONE PROCESS.

This method has been in use for nearly a century. It consists of soaking the seed in a solution of copper sulphate (blue vitriol).

The following mode of application is recommended by the Indiana Experiment Station (Bulletin No. 32)

"In treating oat seed we used cold rain water with one pound of copper sulphate per gallon of water. A common wash tub was filled about two thirds full of water and enough finely powdered Copper Sulphate added to give the above strength. A bushel of seed was put into a coarse woven grain sack, and immersed for five minutes in the copper solution, turning and kneading the sack so as to thoroughly wet the seed. The sack was then placed on bars across the top of the tub to drain a minute, after which the seed was spread thinly on an airy floor. The process was repeated with another bushel of seed and so on until enough had been treated. To hasten the drying and prevent much swelling of the seed, it was dusted heavily and repeatedly with land plaster (pulverized air slaked lime will answer as well,) and mixed thoroughly. It is well to continue the stirring every few minutes for a few hours, and if the seed can be exposed meanwhile to the sun or in a good current of air, so much the better. As each bushel will take up a portion of the solution, it must be replenished from time to time, adding both water and copper sulphate in the proper proportions. Be sure that copper sulphate is finely powdered, or the solution will be too weak at first

and too strong towards the last. A man and a boy can treat six or eight bushels of seed in an hour."

If these directions are carried out this method gives very good results. This method can be improved upon by having a second tub or vessel in which to keep a stock solution of the chemicals. This vessel can also be used to catch the drain from the treated seed.

Cost. The wholesale price of copper sulphate, in barrel lots, is about eight cents per pound. The cost of the chemical and the labor to apply it will make the cost of treatment about four cents per bushel.

Caution. The strength of the solution, and the time of contact must be carefully attended to, or the grain will be damaged by the action of the chemical.

2. THE HOT WATER METHOD. (Jensen's Method)

This method was originated by Prof. Jensen, of Denmark, in 1888. It was introduced into this country through the efforts of Profs. Arthur, Kellerman, Swingle, and others. In this method, as the name implies, the affected grain is treated to a bath of hot (130° to 140° Fah.) water. This method is simple, effective and cheap.

The apparatus necessary for its application is an iron kettle, a thermometer and two barrels. The water in the cask No. 1, should be kept at a temperature of from 125° to 130° Fah. The temperature of the water in cask No. 2, must be kept between 135° and 140° Fah. (not over 140° or under 133°). The grain to be treated is placed in a coarsly woven grain sack (a basket will do,) and immersed in the cask No. 1 until it attains the temperature of the water in the cask. The grain is then removed to cask No. 2. It should remain here for five minutes. During this time the sack should be kept moving constantly. Do not let the water in cask No. 2 fall below 133° F. This degree of temperature can be easily kept up by adding hot water from the kettle. Cold water should be thrown upon the seed immediately after the above treatment. The seed should be dried in the same manner as in the first method.

The Michigan Experiment Station (Bulletin No. 87) recommends that the barrel used should be sunk into the ground so that only a foot or so remains above the surface. The sack of grain may be easily lifted from one cask to the other by means of a long pole, one end of which is fastened to a support. It is estimated that two men in one day can treat enough seed for 20 acres of oats or 40 acres of wheat. These figures bring the cost of treatment per bushel, to about 3 cents for wheat and 5 cents for oats.

The expensive item in this method is the thermometer. A thermometer accurately graduated costs, when guaranteed by the maker, from $1.50 to $2.00. They are fragile instruments, and are quite likely to be broken. This fact, no doubt, will keep many farmers from using this method. To obviate this difficulty we have made arrangements for supplying the farmers of Idaho with thermometers accurate enough for this purpose at a cost of 50 cents apiece.

REMARKS.

Farmers are urged to try one or the other of these methods. The method adopted will depend upon the facilities at your command.

The principle is the same in either method: We seek to destroy the vitality of one seed without injuring the other. With either method the grain will be slightly swollen, and the grain drill or seeder must be regulated accordingly.

Smut destroys not only the commercial value of the grain, but the feeding value also. Smutted grain should never be fed to animals. While it may not exert a positive deleterious action upon the physiological functions of the animal's body, it certainly does no good.

Idaho produces annually 1,320,000 bushels of oats. One-fifth of the oat crop of 1893 was destroyed by smut. Had the seed been treated, there would have been saved to the farmers, deducting the cost of treatment, the sum of $121,937.00 or about $50 per farmer. This is ONE way of making the farm pay.

II.

CARBON BISULPHIDE AS A SQUIRREL EXTERMINATOR.

——BY CHARLES P. FOX, DIRECTOR.——

(This experiment was inaugurated by Dr. McCurdy, Chemist of the Station.)

Another good way to make, or to save, money on the farm is to destroy the "ground squirrel".

This animal is probably the most serious pest with which the western farmer has to deal.

The names "ground squirrel", gopher, &c, are applied to several species belonging to the genus SPERMOPHILUS. The most abundant, and one that does the most damage is a small, grayish animal [S. elegans Kenn.?]

The species found in northern Idaho is S. COLUMBIANUS Ord. [Bulletin No. 5, North American Fauna].

[NOTE.—The accurate determination of the species is the work of the zoologist and not of the agriculturist.]

Various remedies have been tried with the hope of ridding the farms of this pest.

Trapping is a safe remedy, but a rather slow one.

Strychnine has proven a partial success, but its cost and the danger arising from its use prohibits its application on a large scale.

During the last few years the CARBON BISULPHIDE METHOD, originated by Prof. E. W. Hilgard, University of California, has proved to be a cheap. safe and reliable remedy.

Pure Carbon Bisulphide is a heavy, colorless liquid. The commercial article is slightly colored and has a very disagreeable odor. When exposed to the air, Carbon Bisulphide evaporates rapidly. The vapor is heavier than air, very inflammable, and when inhaled it produces faintness, vertigo, headache, etc., [National Dispensatory.] For these reasons some care should be taken when handling the chemical. NEVER bring a LIGHT or FIRE in contact with the vapor.

The chemical is applied as follows:—

A small ball of cotton, rags, dry grass, etc., is saturated [two tablespoonsful will be enough] with the liquid and then introduced into the burrow. The hole is then closed tightly with soil.

Unless the operation is performed in the evening some of the treated holes will be scratched open by out lying squirrels. Mr. P. L. Smith, Colton, Washington, suggests that the remedy be applied in the spring while the ground is yet compact. He recommends the use of balls of dry horse dung instead of cotton. "This reduces the cost, and the rounded mass will carry the chemical beyond the reach of the dirt used in closing the hole."

During the spring of 1893, some experiments with carbon bisulphide were conducted by this Station. At Experimental farm No. 1 [Grangeville], a test was made upon thirty holes. Twenty-seven of these holes were undisturbed; two were scratched open from the OUTSIDE and one from the inside. A number of these holes were afterwards dug open and in each one there was found a dead squirrel. Mr. Norwood. the Assistant Director in charge of the farm, is highly pleased with the result.

Mr. Cash Asst. Director, Experimental farm No. 2, Idaho Falls, writes me as follows:

"The 'Carbon' was used in 59 burrows, 58 of which were never again opened.

About a tablespoonful was used to each burrow. This amount was poured on a handful of straw, dried grass or a piece of old cloth [these served the purpose equally as well] and placed well into the burrow, the entrance then being stopped with earth.

There are two varieties of squirrel here, a small, long-tailed kind, very similar to the "chipmunk" of the East. These live mostly near buildings and are not very numerous. Then there is one about the size of an ordinary rat, reesmbling it in color, but having a thicker body and a stub tail about an inch long; this kind is responsible for most of the damage done to growing crops. They are very troublesome on land that joins uncleared ground.

"The 'Carbon' was also used with marked success in disposing of CHICKEN LICE and BED BUGS where every thing else had failed. Sprinkled on the walls and floor, and the room closed up tightly for a short time, the vermin all leave never to return."

A quantity ot Carbon bisulphide was distributed among the farmers around Moscow and vicinity. Of the fourteen farmers receiving samples of the Chemical, only seven have reported their experience. These are unanimous in their opinion that it is a great success.

Farmers, READ and HEED what your neighbors say.

Mr. Barney J. Olson, Cornwall, Idaho:

"Have lived ir Idaho for sixteen years; have used all kinds of "Squirrel Exterminators," but never found anything equal to Carbon bisulphide. I would say to the farmers of Idaho, that it is the best, safest, and cheapest squirrel poison that can be had."

Mr. F. M. Davis, Uniontown, Wash. used it in thirty five holes, The treatment proved effective in thirty cases.

Mr. J. W. Mowery, Moscow, Idaho: "It is successful; I will use it hereafter."

Mr. Patrick Kinnier had better success with Carbon bisulphide than with any other remedy.

The following letter from Judge William N. Ruby, Colfax, Whitman Co. Wash., proves conclusively what Carbon bisulphide will do:

"You wished a report on the effect of Carbon bisulphide. I shall give it as clearly as I can. I had two thousand acres of wheat this year. Two sections [1280 A.] of this is first crop on sod, and in such cases squirrels are very destructive here. One of these sections [640 A.] I put in with my own men and teams; the other I rented to a neighbor. He used Phosphorus and I used Carbon.

Results: The grain on the section farmed by him is totally destroyed, while the other is sure to yield thirty bushels per acre. When we commenced war on the pests my foreman remarked, "there are squirrels enough on this section to destroy every stalk of wheat on it," and I am sure that he was correct. There was not a perch of land in the square mile that had not one or more dens. We attended to every den, and it cost me $150 for drugs and labor, but we saved between fifteen and twenty thousand bushels of wheat.

Yours Truly,
W. N. RUBY.

Colfax, Washington, July 30, 1893.

The total cost of treatment in this case was about 1 cent a bushel. This investment paid at the rate of 3000 per cent; this is better than life insurance.

Pure Carbon bisulphide is expensive and should never be used for this purpose. The commercial article does better work and is much cheaper.

The best results are secured by using "Fuma" Carbon bisulphide. This brand contains certain impurities which render it more destructive than the commercial article. It is made by E. R. Taylor, Mfg. Chemist, Cleveland, O.

Carbon bisulphide costs, in 100 pound lots on board cars at Cleveland, O., ten cents a pound. The freight to points in Idaho will be about $2 to $3. One hundred pounds will be sufficient quantity to treat 1600 burrows. The chemical will cost nearly one cent a hole. The cost of the application will depend upon the ability of the laborer and the kind of material used as the absorbent [cotton, rags, waste, etc]. We believe that the cost can be brought below two cents per hole.

Farmers must decide for themselves whether the cost of treatment will balance the value of the grain saved.

Every squirrel certainly destroys more than two cents worth of grain during its lifetime, and perhaps that much each year.

Mr. E. R. Taylor has kindly donated to this Station a sample of his celebrated "Fuma" brand of Carbon bisulphide. Through his generosity the Station will be able to distribute next spring small samples to those farmers who are willing to report their results to us. Farmers near Grangeville will be supplied from Experimental Farm No. 1. Those near Idaho Falls, from Farm No. 2. It can also be secured at Farm No. 3, at Nampa. Moscow and vicinity will be supplied from the central office, University Building, Moscow. Samples will be

sent to farmers provided the express charges are paid by the receivers. Farmers calling for Carbon bisulphide must furnish their own jugs, bottles, etc.

As the quantity at our disposal is limited, requests will be filled as received until the supply is exhausted.

III.

A NEW SQUIRREL EXTERMINATOR.

Our attention has been called to a new squirrel exterminator that has given quite satisfactory results. We refer to the Erickson Squirrel Bomb, invented and patented by Mr. O. S. Erickson of Moscow. The invention is the result of several years of careful study on the part of the inventor.

The bombs are cylindrical in form and about the size of a candle. The cylinder is made of heavy paper soaked in paraffine to render it water proof. The contents of the bomb consists of a small amount of gunpowder and a mixture of certain chemicals. The cylinder is filled about one third full of gunpowder and the remaining space with the chemicals; a piece of fuse extends from the powder through the chemical to the outside.

The bomb is placed in a burrow, the entrance of the burrow is closed with soil before the fuse is fired. As the fuse burns slowly downward, the chemical ignites and forms a heavy, poisonous vapor very similar to that of Carbon bisulphide but much more suffocating. The explosion of the powder drives the gas in all directions. In this manner every portion of the burrow is filled with the gas.

This method posesses a few merits over the Carbon bisulphide method. These are:

1. The distribution of the gas is uniform, and all parts of the burrow are reached.

2. The gas is distributed by forces other than gravity.

3. The gas is more effective than the vapor of Carbon bisulphide.

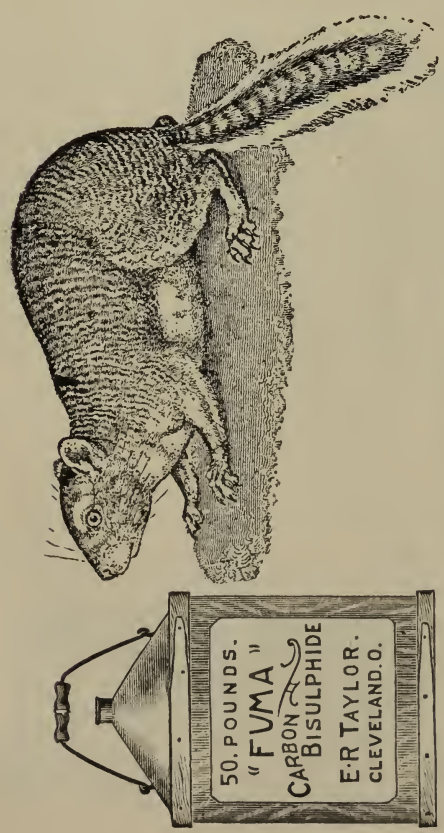
This bomb is manufactured and sold by the Shields Hardware Co. Moscow, Idaho. The price, at present, is five cents per bomb.

It is hoped that the cost of this valuable invention can be so reduced as to bring it within the reach of the farmer.

The Carbon bisulphide method has the great advantage of being much cheaper.

Mr. Erickson has been a close observer of the habits of the ground squirrel. He recommends that all remedies be applied in the spring. At this period the squirrels will be found on the ridges and high ground, and living in SHALLOW burrows. As the season advances the animals scatter, and seek the lower lands. Here the burrows are sunk to a greater depth.

He estimates that the expense of destroying the squirrels on a given area may be reduced one half [saving of labor and material] by applying the remedy in the spring.



The *defense* is rank; it smells to heaven. [Shakespeare applied.]

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